ULTRAFAST TRANSIENT ABSORPTION SPECTROSCOPY OF PHOTOCHEMICAL DYNAMICS IN SOLUTION

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The methods of ultrafast UV-visible and mid-IR transient absorption spectroscopy are powerful probes of dynamical processes occurring in solution [1]. They can be used to determine the rates and mechanisms of chemical and photochemical reactions, identify short-lived reactive intermediates, and examine how the dynamics are modified by solute-solvent interactions. The mechanistic insights which derive from the application of transient absorption spectroscopy will be illustrated by recent studies of solvent effects on electronically non-adiabatic pathways in photoexcited molecules, and direct observation of the intermediates involved in radical reactions controlled by the use of organic photoredox catalysts [2].

[1] Taking the plunge: chemical reaction dynamics in liquids, A.J. Orr-Ewing, Chem. Soc. Rev. 2017, 46, 7597-7614. DOI: 10.1039/C7CS00331E. [2] Ultrafast observation of a photoredox reaction mechanism: photo-initiation in organocatalyzed atom-transfer radial polymerization, D. Koyama, H.J.A. Dale and A.J. Orr-Ewing, J. Am. Chem. Soc. 2018, 140, 1285-1293. DOI: 10.1021/jacs.7b07829.